BIOMECHANICAL ANALYSES OF 10 CONSECUTIVE SOCCER INSTEP KICKS

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INTRODUCTION

Soccer kick is the main offensive action during the game and has been extensively studied. However the optimal number of consecutive kicks to maintain biomechanical stability is unclear. This study was to examine decreasing curve of some selected biomechanical variables during 10 consecutive instep kicks.

METHODS

The kicking motions of dominant legs under speed situation were captured from five experienced adult male soccer players (height: 184.60, ± 4.49 cm; mass: 80 ± 4.24 kg; age: 25.60, ± 1.14 years) using a three-dimensional cinematographic technique at 200 Hz. Some of important kinematics and kinetics parameters include maximum thigh angular velocity (TAV), maximum lower leg angular velocity (LAV), maximum thigh moment (TM), and maximum lower leg moment (LT) at forward and impact phases and finally maximum ball velocity (BV) after impact selected to analyses.

RESULTS AND DISSCUSION

There was a significant decrease of ball velocity between the first (30.85 ± 0.29 m/s) and the fifth kick (30.32 ± 0.13 m/s; $p \leq 0.032$) and the subsequent kick thereafter, as showed in figure 1. Similarly the lower leg angular velocity showed a significant decrease after the fifth kick and thereafter. The thigh angular velocity is shown to decrease after the sixth kick and thereafter comparing to the first kick. Lowest significant relative to first kick in leg lower moment is fourth kick, but in thigh moment is sixth kick (table1). These results indicate that experienced adult male soccer players maintained high kinematics and kinetics characteristics and well-coordinated inter-segmental motion during the first 5 kicks.
The knee extensor muscles are mainly responsible during soccer instep kicking, and after the fourth fatigue is observed which in turn affected the lower leg moment and angular velocity rather than thigh moment angular velocity. Subsequently, the force generated from the knee extensors is transmitted to the thigh flexors muscles.

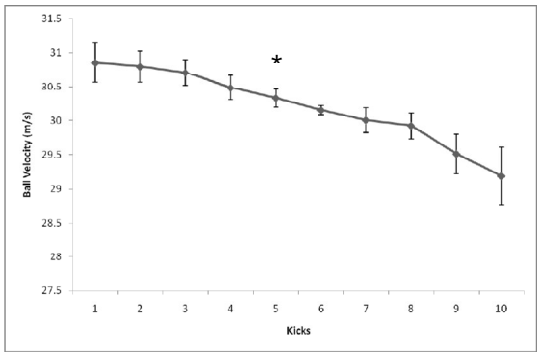

Figure 1. Decreasing curve of ball velocity during 10 consecutive soccer instep kicks. * is lowest significant difference relative to first kick.

CONCLUSIONS

We concluded that 5 consecutive kicks are adequate to achieve high kinematics and kinetics responses. Selecting more than 5 kick, probably, do not gain any high biomechanical responds for analyzing, because of fatigue affect.

REFERENCE

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Table 1. Lowest significant of Selected Kinematics and kinetics variables relative to first kick.

Variables	Mean of First Kick	Number of first significant kick	Lowest significant	P value
TAV	18.83 **(rad/s)**	6th	18.23 **(rad/s)**	0.006
LAV	40.26 **(rad/s)**	5th	39.27 **(rad/s)**	0.016
TM	20.58 (N.m)	6th	19.81(N.m)	0.001
LM	92.13 (N.m)	4th	89.77 (N.m)	0.009